



BEST AVAILABLE COPY

SEQUENCE LISTING

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<120> METHODS FOR MAKING AND USING FATTY ACID
SYNTHESIS PATHWAY REAGENTS

<130> GM50068

<140> TO BE ASSIGNED

<141> 2002-03-25

<150> PCT/US00/29451

<151> 2000-10-26

<150> 60/161,775

<151> 1999-10-27

<160> 37

<170> FastSEQ for Windows Version 4.0

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<212> DNA

<213> Staphylococcus aureus

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gttgcagctg acgtattatc atttgaagat gcagttaaaa ttgttagaaa acgtgggtcaa 420
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<210> 2

<211> 332

<212> PRT

<213> Staphylococcus aureus

<400> 2

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      20           25           30
Pro Gly Gln Gly Ala Gln Lys Val Gly Met Ala Gln Asp Leu Phe Asn
      35           40           45
Asn Asn Asp Gln Ala Thr Glu Ile Leu Thr Ser Ala Ala Lys Thr Leu
      50           55           60
Asp Phe Asp Ile Leu Glu Thr Met Phe Thr Asp Glu Glu Gly Lys Leu
65           70           75           80
Gly Glu Thr Glu Asn Thr Gln Pro Ala Leu Leu Thr His Ser Ser Ala
      85           90           95
Leu Leu Ala Ala Leu Lys Ile Leu Asn Pro Asp Phe Thr Met Gly His
      100          105          110
Ser Leu Gly Glu Tyr Ser Ser Leu Val Ala Ala Asp Val Leu Ser Phe
      115          120          125
Glu Asp Ala Val Lys Ile Val Arg Lys Arg Gly Gln Leu Met Ala Gln
      130          135          140
Ala Phe Pro Thr Gly Val Gly Ser Met Ala Ala Val Leu Gly Leu Asp
145          150          155          160
Phe Asp Lys Val Asp Glu Ile Cys Lys Ser Leu Ser Ser Asp Asp Lys
      165          170          175
Ile Ile Glu Pro Ala Asn Ile Asn Cys Pro Gly Gln Ile Val Val Ser
      180          185          190

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	210					215					220				
Ser	Leu	Met	Lys	Val	Ile	Glu	Glu	Asp	Phe	Ser	Ser	Tyr	Ile	Asn	Gln
225					230					235					240
Phe	Glu	Trp	Arg	Asp	Ala	Lys	Phe	Pro	Val	Val	Gln	Asn	Val	Asn	Ala
			245					250						255	
Gln	Gly	Glu	Thr	Asp	Lys	Glu	Val	Ile	Lys	Ser	Asn	Met	Val	Lys	Gln
		260						265					270		
Leu	Tyr	Ser	Pro	Val	Gln	Phe	Ile	Asn	Ser	Thr	Glu	Trp	Leu	Ile	Asp
	275						280					285			
Gln	Gly	Val	Asp	His	Phe	Ile	Glu	Ile	Gly	Pro	Gly	Lys	Val	Leu	Ser
	290					295					300				
Gly	Leu	Ile	Lys	Lys	Ile	Asn	Arg	Asp	Val	Lys	Leu	Thr	Ser	Ile	Gln
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<213> Staphylococcus aureus

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			20					25					30		
Ala	Thr	Glu	Ile	Leu	Thr	Ser	Ala	Ala	Lys	Thr	Leu	Asp	Phe	Asp	Ile
		35					40					45			
Leu	Glu	Thr	Met	Phe	Thr	Asp	Glu	Glu	Gly	Lys	Leu	Gly	Glu	Thr	Glu
	50					55					60				
Asn	Thr	Gln	Pro	Ala	Leu	Leu	Thr	His	Ser	Ser	Ala	Leu	Leu	Ala	Ala
65					70				75					80	
Leu	Lys	Ile	Leu	Asn	Pro	Asp	Phe	Thr	Met	Gly	His	Ser	Leu	Gly	Glu
			85					90						95	
Tyr	Ser	Ser	Leu	Val	Ala	Ala	Asp	Val	Leu	Ser	Phe	Glu	Asp	Ala	Val
			100					105						110	

Lys Ile Val Arg Lys Arg Gly Gln Leu Met Ala Gln Ala Phe Pro Thr
 115 120 125
 Gly Val Gly Ser Met Ala Ala Val Leu Gly Leu Asp Phe Asp Lys Val
 130 135 140
 Asp Glu Ile Cys Lys Ser Leu Ser Ser Asp Asp Lys Ile Ile Glu Pro
 145 150 155 160
 Ala Asn Ile Asn Cys Pro Gly Gln Ile Val Val Ser Gly His Lys Ala
 165 170 175
 Leu Ile Asp Glu Leu Val Glu Lys Gly Lys Ser Leu Gly Ala Lys Arg
 180 185 190
 Val Met Pro Leu Ala Val Ser Gly Pro Phe His Ser Ser Leu Met Lys
 195 200 205
 Val Ile Glu Glu Asp Phe Ser Ser Tyr Ile Asn Gln Phe Glu Trp Arg
 210 215 220
 Asp Ala Lys Phe Pro Val Val Gln Asn Val Asn Ala Gln Gly Glu Thr
 225 230 235 240
 Asp Lys Glu Val Ile Lys Ser Asn Met Val Lys Gln Leu Tyr Ser Pro
 245 250 255
 Val Gln Phe Ile Asn Ser Thr Glu Trp Leu Ile Asp Gln Gly Val Asp
 260 265 270
 His Phe Ile Glu Ile Gly Pro Gly Lys Val Leu Ser Gly Leu Ile Lys
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 Lys Ile Asn Arg Asp Val Lys Leu Thr Ser Ile Gln Thr Leu Glu Asp
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 Val Lys Gly Trp Asn Glu Asn Asp
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<212> DNA

<213> Staphylococcus aureus

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 tattttgagc aatttttaga tacatctgat gaatggattt ctaagatgac tggaattaaa 180
 gaaagacatt gggcagatga cgatcaagat acttcagatt tagcatatga agcaagtgtg 240
 aaagcaatcg ctgacgctgg tattcagcct gaagatatag atatgataat tgttgccaca 300
 gcaactggag atatgccatt tccaactgtc gcaaatatgt tgcaagaacg tttagggacg 360

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aaattatcta aaataacaga tttaactgac cgttctactg cagttctatt tggagatggt 540
gcaggtgcgg ttatcatcgg tgaagtttca gaaggcagag gtattataag ttatgaaatg 600
ggttctgatg gcactggtgg taaacattta tatttagata aagatactgg taaactgaaa 660
atgaatggtc gagaagtatt taaatttgct gttagaatta tgggtgatgc atcaacacgt 720
gtagttgaaa aagcgaattt aacatcagat gatatagatt tatttattcc tcatcaagct 780
aatattagaa ttatggaatc agctagagaa cgcttaggta tttcaaaaga caaatgagt 840
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<210> 5

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<212> PRT

<213> Staphylococcus aureus

<400> 5

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      20           25           30
Pro Glu Lys Ile Ile Asp Asn Ala Tyr Phe Glu Gln Phe Leu Asp Thr
      35           40           45
Ser Asp Glu Trp Ile Ser Lys Met Thr Gly Ile Lys Glu Arg His Trp
      50           55           60
Ala Asp Asp Asp Gln Asp Thr Ser Asp Leu Ala Tyr Glu Ala Ser Val
65           70           75           80
Lys Ala Ile Ala Asp Ala Gly Ile Gln Pro Glu Asp Ile Asp Met Ile
      85           90           95
Ile Val Ala Thr Ala Thr Gly Asp Met Pro Phe Pro Thr Val Ala Asn
      100          105          110
Met Leu Gln Glu Arg Leu Gly Thr Gly Lys Val Ala Ser Met Asp Gln
      115          120          125
Leu Ala Ala Cys Ser Gly Phe Met Tyr Ser Met Ile Thr Ala Lys Gln
      130          135          140
Tyr Val Gln Ser Gly Asp Tyr His Asn Ile Leu Val Val Gly Ala Asp
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Lys Leu Ser Lys Ile Thr Asp Leu Thr Asp Arg Ser Thr Ala Val Leu
      165          170          175

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		195					200					205			
His	Leu	Tyr	Leu	Asp	Lys	Asp	Thr	Gly	Lys	Leu	Lys	Met	Asn	Gly	Arg
	210					215					220				
Glu	Val	Phe	Lys	Phe	Ala	Val	Arg	Ile	Met	Gly	Asp	Ala	Ser	Thr	Arg
225					230					235					240
Val	Val	Glu	Lys	Ala	Asn	Leu	Thr	Ser	Asp	Asp	Ile	Asp	Leu	Phe	Ile
				245					250					255	
Pro	His	Gln	Ala	Asn	Ile	Arg	Ile	Met	Glu	Ser	Ala	Arg	Glu	Arg	Leu
			260					265					270		
Gly	Ile	Ser	Lys	Asp	Lys	Met	Ser	Val	Ser	Val	Asn	Lys	Tyr	Gly	Asn
		275					280					285			
Thr	Ser	Ala	Ala	Ser	Ile	Pro	Leu	Ser	Ile	Asp	Gln	Glu	Leu	Lys	Asn
	290					295					300				
Gly	Lys	Leu	Lys	Asp	Asp	Asp	Thr	Ile	Val	Leu	Val	Gly	Phe	Gly	Gly
305					310					315					320
Gly	Leu	Thr	Trp	Gly	Ala	Met	Thr	Ile	Lys	Trp	Gly	Lys			
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<210> 6

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<212> PRT

<213> Staphylococcus aureus

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			20					25					30		
Asp	Glu	Trp	Ile	Ser	Lys	Met	Thr	Gly	Ile	Lys	Glu	Arg	His	Trp	Ala
		35					40					45			
Asp	Asp	Asp	Gln	Asp	Thr	Ser	Asp	Leu	Ala	Glu	Ala	Ser	Val	Lys	Ala
	50					55					60				
Ile	Ala	Asp	Ala	Gly	Ile	Gln	Pro	Glu	Asp	Ile	Asp	Met	Ile	Ile	Val
65					70					75					80
Ala	Thr	Ala	Thr	Gly	Asp	Met	Pro	Phe	Pro	Thr	Val	Ala	Asn	Met	Leu
				85					90					95	

Gln	Glu	Arg	Leu	Gly	Thr	Gly	Lys	Val	Ala	Ser	Met	Asp	Gln	Leu	Ala			
			100					105					110					
Ala	Cys	Ser	Gly	Phe	Met	Tyr	Ser	Met	Ile	Thr	Ala	Lys	Gln	Tyr	Val			
		115					120					125						
Gln	Ser	Gly	Asp	Tyr	His	Asn	Ile	Leu	Val	Val	Gly	Ala	Asp	Lys	Leu			
		130				135					140							
Ser	Lys	Ile	Thr	Asp	Leu	Thr	Asp	Arg	Ser	Thr	Ala	Val	Leu	Phe	Gly			
145					150				155						160			
Asp	Gly	Ala	Gly	Ala	Val	Ile	Ile	Gly	Glu	Val	Ser	Glu	Gly	Arg	Gly			
			165					170						175				
Ile	Ile	Ser	Tyr	Glu	Met	Gly	Ser	Asp	Gly	Thr	Gly	Gly	Lys	His	Leu			
		180						185					190					
Tyr	Leu	Asp	Lys	Asp	Thr	Gly	Lys	Leu	Lys	Met	Asn	Gly	Arg	Glu	Val			
		195					200					205						
Phe	Lys	Phe	Ala	Val	Arg	Ile	Met	Gly	Asp	Ala	Ser	Thr	Arg	Val	Val			
	210					215					220							
Glu	Lys	Ala	Asn	Leu	Thr	Ser	Asp	Asp	Ile	Asp	Leu	Phe	Ile	Pro	His			
225					230					235					240			
Gln	Ala	Asn	Ile	Arg	Ile	Met	Glu	Ser	Ala	Arg	Glu	Arg	Leu	Gly	Ile			
			245						250					255				
Ser	Lys	Asp	Lys	Met	Ser	Val	Ser	Val	Asn	Lys	Tyr	Gly	Asn	Thr	Ser			
		260						265					270					
Ala	Ala	Ser	Ile	Pro	Leu	Ser	Ile	Asp	Gln	Glu	Leu	Lys	Asn	Gly	Lys			
		275					280					285						
Leu	Lys	Asp	Asp	Asp	Thr	Ile	Val	Leu	Val	Gly	Phe	Gly	Gly	Gly	Leu			
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Thr	Trp	Gly	Ala	Met	Thr	Ile	Lys	Trp	Gly	Lys								
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<211> 741

<212> DNA

<213> Staphylococcus aureus

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gcaaattgtg ccgatgctga tgaagttaaa gcaatgatta aagaagtagt tagccaattt 240

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atccaaaaag caacaccaca aatgttaaga caacgtagtg gtgctatcat caatttatca 420
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gaacaaatgt tgactcgaat tccgtttagca cgttttggtc aagacacaga tattgctaata 660
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<211> 246

<212> PRT

<213> *Staphylococcus aureus*

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      20           25           30
Val Asn Tyr Ala Gly Ser Lys Glu Lys Ala Glu Ala Val Val Glu Glu
      35           40           45
Ile Lys Ala Lys Gly Val Asp Ser Phe Ala Ile Gln Ala Asn Val Ala
      50           55           60
Asp Ala Asp Glu Val Lys Ala Met Ile Lys Glu Val Val Ser Gln Phe
65           70           75           80
Gly Ser Leu Asp Val Leu Val Asn Asn Ala Gly Ile Thr Arg Asp Asn
      85           90           95
Leu Leu Met Arg Met Lys Glu Gln Glu Trp Asp Asp Val Ile Asp Thr
      100          105          110
Asn Leu Lys Gly Val Phe Asn Cys Ile Gln Lys Ala Thr Pro Gln Met
      115          120          125
Leu Arg Gln Arg Ser Gly Ala Ile Ile Asn Leu Ser Ser Val Val Gly
      130          135          140
Ala Val Gly Asn Pro Gly Gln Ala Asn Tyr Val Ala Thr Lys Ala Gly
145          150          155          160
Val Ile Gly Leu Thr Lys Ser Ala Ala Arg Glu Leu Ala Ser Arg Gly
      165          170          175
Ile Thr Val Asn Ala Val Ala Pro Gly Phe Ile Val Ser Asp Met Thr
      180          185          190

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Asp Ala Leu Ser Asp Glu Leu Lys Glu Gln Met Leu Thr Arg Ile Pro
 195 200 205
 Leu Ala Arg Phe Gly Gln Asp Thr Asp Ile Ala Asn Thr Val Ala Phe
 210 215 220
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 225 230 235 240
 Asn Gly Gly Met Tyr Met
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 <213> Staphylococcus aureus

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 ttattaattg ataaagtagt tgaatatgaa gaaggtcaac gttgtgtggc tattaaacaa 180
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 aataaaggta aaatcgcttt atttgctggg attgataaat gtcgttttaa acgtcaagta 360
 gtacctgggtg atactttaac gttggaagta gaaatcacta aaattaaagg accaatcggt 420
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 Ile Ile Pro His Arg Gln Pro Phe Leu Leu Ile Asp Lys Val Val Glu
 35 40 45
 Tyr Glu Glu Gly Gln Arg Cys Val Ala Ile Lys Gln Val Ser Gly Asn
 50 55 60

Glu Pro Phe Phe Gln Gly His Phe Pro Glu Tyr Ala Val Met Pro Gly
 65 70 75 80
 Val Leu Ile Thr Glu Ala Leu Ala Gln Thr Gly Ala Val Ala Ile Leu
 85 90 95
 Asn Ser Glu Glu Asn Lys Gly Lys Ile Ala Leu Phe Ala Gly Ile Asp
 100 105 110
 Lys Cys Arg Phe Lys Arg Gln Val Val Pro Gly Asp Thr Leu Thr Leu
 115 120 125
 Glu Val Glu Ile Thr Lys Ile Lys Gly Pro Ile Gly Lys Gly Asn Ala
 130 135 140
 Lys Ala Thr Val Asp Gly Gln Leu Ala Cys Ser Cys Glu Leu Thr Phe
 145 150 155 160
 Ala Ile Gln Asp Val Lys
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<212> DNA

<213> Staphylococcus aureus

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 cgtaaagaac gtagccgtaa agagcttgaa aaattattag aacaattaaa tcaaccagaa 180
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 attagttctt actcattaac aattgtggct catgaagcta aaaaattaat gccagaaggt 420
 ggtagcattg ttgcaacaac atatttaggt ggcggaattcg cagttcaaaa ttataatgtg 480
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<212> PRT

<213> Staphylococcus aureus

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			20					25					30		
Gly	Ala	Lys	Leu	Val	Phe	Thr	Tyr	Arg	Lys	Glu	Arg	Ser	Arg	Lys	Glu
		35					40					45			
Leu	Glu	Lys	Leu	Leu	Glu	Gln	Leu	Asn	Gln	Pro	Glu	Ala	His	Leu	Tyr
	50					55					60				
Gln	Ile	Asp	Val	Gln	Ser	Asp	Glu	Glu	Val	Ile	Asn	Gly	Phe	Glu	Gln
65				70						75					80
Ile	Gly	Lys	Asp	Val	Gly	Asn	Ile	Asp	Gly	Val	Tyr	His	Ser	Ile	Ala
			85					90					95		
Phe	Ala	Asn	Met	Glu	Asp	Leu	Arg	Gly	Arg	Phe	Ser	Glu	Thr	Ser	Arg
			100					105					110		
Glu	Gly	Phe	Leu	Leu	Ala	Gln	Asp	Ile	Ser	Ser	Tyr	Ser	Leu	Thr	Ile
		115					120					125			
Val	Ala	His	Glu	Ala	Lys	Lys	Leu	Met	Pro	Glu	Gly	Gly	Ser	Ile	Val
	130					135						140			
Ala	Thr	Thr	Tyr	Leu	Gly	Gly	Glu	Phe	Ala	Val	Gln	Asn	Tyr	Asn	Val
145				150					155						160
Met	Gly	Val	Ala	Lys	Ala	Ser	Leu	Glu	Ala	Asn	Val	Lys	Tyr	Leu	Ala
			165					170					175		
Leu	Asp	Leu	Gly	Pro	Asp	Asn	Ile	Arg	Val	Asn	Ala	Ile	Ser	Ala	Gly
		180						185					190		
Pro	Ile	Arg	Thr	Leu	Ser	Ala	Lys	Gly	Val	Gly	Gly	Phe	Asn	Thr	Ile
	195					200						205			
Leu	Lys	Glu	Ile	Glu	Glu	Arg	Ala	Pro	Leu	Lys	Arg	Asn	Val	Asp	Gln
	210					215					220				
Val	Glu	Val	Gly	Lys	Thr	Ala	Ala	Tyr	Leu	Leu	Ser	Asp	Leu	Ser	Ser
225				230					235						240
Gly	Val	Thr	Gly	Glu	Asn	Ile	His	Val	Asp	Ser	Gly	Phe	His	Ala	
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<212> DNA

<213> Staphylococcus aureus

<400> 13

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cgtatcgata ctgaacctta tagcggtcac ttagcaggag aacttaaaaa ctttaatat 180
gaagatcata tcgacaaaaa agaagcgcgt cgtatggata gatttactca atatgcaatt 240
gtagcagcta gagaggctgt taaagatgcg caattagata tcaatgataa tactgcagat 300
cgaatcgggtg tatggattgg ttctgggtatc ggtgggtatgg aaacatttga aattgcacat 360
aaacaattaa tggataaagg cccaagacgt gtgagtccat ttttcgtacc aatgttaatt 420
cctgatatgg caactgggca agtatcaatt gacttaggtg caaaaggacc aaatgggtgca 480
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cgcgggtgatg cagatgcaat gattactggt ggtacggaag ctccaatcac tcatatggca 600
attgcaggtt tcagtgcagc tcgagcgctt tctacaaatg atgacattga aacagcatgt 660
cgtccattcc aagaaggtag agacgggtttt gttatgggtg aagggtgctgg tatttttagta 720
atcgaatctt tagaatcagc acaagctcga ggtgccataa tttatgctga gatagttggc 780
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<210> 14

<211> 414

<212> PRT

<213> *Staphylococcus aureus*

<400> 14

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Pro Ile Gly Asn Asp Val Lys Thr Thr Trp Glu Asn Ala Leu Lys Gly
      20           25           30
Val Asn Gly Ile Asp Lys Ile Thr Arg Ile Asp Thr Glu Pro Tyr Ser
      35           40           45
Val His Leu Ala Gly Glu Leu Lys Asn Phe Asn Ile Glu Asp His Ile
      50           55           60
Asp Lys Lys Glu Ala Arg Arg Met Asp Arg Phe Thr Gln Tyr Ala Ile
65           70           75           80
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Val	Ala	Ala	Arg	Glu	Ala	Val	Lys	Asp	Ala	Gln	Leu	Asp	Ile	Asn	Asp	
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Asn	Thr	Ala	Asp	Arg	Ile	Gly	Val	Trp	Ile	Gly	Ser	Gly	Ile	Gly	Gly	
			100					105					110			
Met	Glu	Thr	Phe	Glu	Ile	Ala	His	Lys	Gln	Leu	Met	Asp	Lys	Gly	Pro	
			115				120					125				
Arg	Arg	Val	Ser	Pro	Phe	Phe	Val	Pro	Met	Leu	Ile	Pro	Asp	Met	Ala	
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Thr	Gly	Gln	Val	Ser	Ile	Asp	Leu	Gly	Ala	Lys	Gly	Pro	Asn	Gly	Ala	
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			165					170					175			
Lys	Ile	Val	Gln	Arg	Gly	Asp	Ala	Asp	Ala	Met	Ile	Thr	Gly	Gly	Thr	
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Glu	Ala	Pro	Ile	Thr	His	Met	Ala	Ile	Ala	Gly	Phe	Ser	Ala	Ser	Arg	
			195				200					205				
Ala	Leu	Ser	Thr	Asn	Asp	Asp	Ile	Glu	Thr	Ala	Cys	Arg	Pro	Phe	Gln	
			210			215					220					
Glu	Gly	Arg	Asp	Gly	Phe	Val	Met	Gly	Glu	Gly	Ala	Gly	Ile	Leu	Val	
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Ile	Glu	Ser	Leu	Glu	Ser	Ala	Gln	Ala	Arg	Gly	Ala	Asn	Ile	Tyr	Ala	
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			260					265				270				
Pro	Ala	Pro	Glu	Gly	Glu	Gly	Gly	Ser	Arg	Ala	Met	Gln	Ala	Ala	Met	
			275			280						285				
Asp	Asp	Ala	Gly	Ile	Glu	Pro	Lys	Asp	Val	Gln	Tyr	Leu	Asn	Ala	His	
			290			295					300					
Gly	Thr	Ser	Thr	Pro	Val	Gly	Asp	Leu	Asn	Glu	Val	Lys	Ala	Ile	Lys	
305				310					315					320		
Asn	Thr	Phe	Gly	Glu	Ala	Ala	Lys	His	Leu	Lys	Val	Ser	Ser	Thr	Lys	
			325					330					335			
Ser	Met	Thr	Gly	His	Leu	Leu	Gly	Ala	Thr	Gly	Gly	Ile	Glu	Ala	Ile	
			340					345				350				
Phe	Ser	Ala	Leu	Ser	Ile	Lys	Asp	Ser	Lys	Val	Ala	Pro	Thr	Ile	His	
			355			360					365					
Ala	Val	Thr	Pro	Asp	Pro	Glu	Cys	Asp	Leu	Asp	Ile	Val	Pro	Asn	Glu	
			370			375					380					
Ala	Gln	Asp	Leu	Asp	Ile	Thr	Tyr	Ala	Met	Ser	Asn	Ser	Leu	Gly	Phe	
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Gly Gly His Asn Ala Val Leu Val Phe Lys Lys Phe Glu Ala

405

410

<210> 15

<211> 975

<212> DNA

<213> Streptococcus pneumoniae

<400> 15

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cgacaaaggc atatttcaag aacagaatct accagtgatt tggctacaga ggttgctaag 180
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attactccag attcgatgat gccctctaca gctgctcgtg ttcaagctaa tattggcgct 300
aataaagcct ttgcttttga cttaaccgcg gcttgacgtg gatttgtatt tgctctttca 360
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agcgatggaa gtcgcagcga gtgtttaact tatgggcatt caggtttgca ttctccattt 600
tcagatcaag aaagtgcaga ttcgtttttg aagatggatg gacgcacagt ctttgatttt 660
gccattcgag atgtagccaa gtctatcaag cagactattg atgaatctcc tatagagggtg 720
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agaaaaattg gtgttgaccg agccaaactt ccagccaata tgatggaata tggcaatacc 840
agtgcagcca gtatcccgat tttactttca gagtgtgtag aacaaggctt catcccttta 900
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<210> 16

<211> 324

<212> PRT

<213> Streptococcus pneumoniae

<400> 16

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Val Val Thr Asn His Asp Leu Ala Gln Ile Met Asp Thr Asn Asp Glu
          20          25          30
Trp Ile Ser Ser Arg Thr Gly Ile Arg Gln Arg His Ile Ser Arg Thr
          35          40          45
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<212> DNA

<213> Streptococcus pneumoniae

<400> 17

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gaccgtgtct tggaagtgag cgaggatacc attgttgcta tcaaaaatgt gaccatcaac 180
gagcctttct ttaacggcca ctttcctcaa taccagtta tgccagggtgt tgtgattatg 240
gaagccttgg cgcaaactgc cgggtgtgttg gagttatcaa aacctgaaaa taaaggaaaa 300
ctggtctttt acgctgggtat ggacaagggtt aagttcaaga agcaagttgt accaggcgac 360
caattgggta tgacagcgac ttttgtaaaa cgctcgtggca ccatagctgt ggttgaagca 420
aaggctgaag tggatggcaa gcttgcagcc agtggtaccc ttacttttgc aattgggaac 480
taa 483
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<210> 18

<211> 160

<212> PRT

<213> Streptococcus pneumoniae

<400> 18

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Met Gly Ser Ser His His His His His His Ser Ser Gly Leu Val Pro
 1          5          10          15
Arg Gly Ser His Met Ile Asp Ile Gln Gly Ile Lys Glu Ala Leu Pro
      20          25          30
His Arg Tyr Pro Met Leu Leu Val Asp Arg Val Leu Glu Val Ser Glu
      35          40          45
Asp Thr Ile Val Ala Ile Lys Asn Val Thr Ile Asn Glu Pro Phe Phe
      50          55          60
Asn Gly His Phe Pro Gln Tyr Pro Val Met Pro Gly Val Val Ile Met
      65          70          75          80
Glu Ala Leu Ala Gln Thr Ala Gly Val Leu Glu Leu Ser Lys Pro Glu
      85          90          95
Asn Lys Gly Lys Leu Val Phe Tyr Ala Gly Met Asp Lys Val Lys Phe
      100          105          110
Lys Lys Gln Val Val Pro Gly Asp Gln Leu Val Met Thr Ala Thr Phe
      115          120          125
Val Lys Arg Arg Gly Thr Ile Ala Val Val Glu Ala Lys Ala Glu Val
      130          135          140
Asp Gly Lys Leu Ala Ala Ser Gly Thr Leu Thr Phe Ala Ile Gly Asn
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<210> 19

<211> 1296

<212> DNA

<213> Streptococcus pneumoniae

<400> 19

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tttgatcata gtgactttga tgtgcataat gcggcagaaa tccaagattt tccgttcgat 240
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gcagcccaag aggctgtaaa tcatgccaat cttgatgtag aggctcttaa tagggatcgt 360
tttggtgtta tcgttgcac tgggtattggt ggaatcaagg aaattgaaga tcagggtactt 420
cgccttcatg aaaaaggacc caaacgtgtc aaaccaatga ctcttccaaa agctttacca 480
aatatggctt ctgggaatgt agccatgcgt tttggtgcaa acggtgtttg taaatctatc 540
aatactgcct gctcttcac aaatgatgcg attggggatg ccttccgctc cattaagttt 600
ggtttccaag atgtgatgtt ggtgggagga acagaagctt ctatcacacc ttttgccatc 660
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gctgcgggtg cagtagaagc tatcgtcacc atcgaagcta tgcgtcataa ctttgtacca 1140
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ggcttggaga aagaaattcc atacgctatt tcaaatactt ttgggttttg aggccacaat 1260
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<210> 20

<211> 431

<212> PRT

<213> Streptococcus pneumoniae

<400> 20

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1

5

10

15

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			20					25					30					
Val	Thr	Ser	Pro	Ile	Gly	Asn	Thr	Pro	Glu	Glu	Phe	Trp	Asn	Ser	Leu			
		35					40					45						
Ala	Thr	Gly	Lys	Ile	Gly	Ile	Gly	Gly	Ile	Thr	Lys	Phe	Asp	His	Ser			
		50				55					60							
Asp	Phe	Asp	Val	His	Asn	Ala	Ala	Glu	Ile	Gln	Asp	Phe	Pro	Phe	Asp			
65					70					75					80			
Lys	Tyr	Phe	Val	Lys	Lys	Asp	Thr	Asn	Arg	Phe	Asp	Asn	Tyr	Ser	Leu			
			85					90					95					
Tyr	Ala	Leu	Tyr	Ala	Ala	Gln	Glu	Ala	Val	Asn	His	Ala	Asn	Leu	Asp			
			100					105					110					
Val	Glu	Ala	Leu	Asn	Arg	Asp	Arg	Phe	Gly	Val	Ile	Val	Ala	Ser	Gly			
		115					120					125						
Ile	Gly	Gly	Ile	Lys	Glu	Ile	Glu	Asp	Gln	Val	Leu	Arg	Leu	His	Glu			
		130				135					140							
Lys	Gly	Pro	Lys	Arg	Val	Lys	Pro	Met	Thr	Leu	Pro	Lys	Ala	Leu	Pro			
145					150					155					160			
Asn	Met	Ala	Ser	Gly	Asn	Val	Ala	Met	Arg	Phe	Gly	Ala	Asn	Gly	Val			
			165					170					175					
Cys	Lys	Ser	Ile	Asn	Thr	Ala	Cys	Ser	Ser	Ser	Asn	Asp	Ala	Ile	Gly			
			180					185					190					
Asp	Ala	Phe	Arg	Ser	Ile	Lys	Phe	Gly	Phe	Gln	Asp	Val	Met	Leu	Val			
		195					200					205						
Gly	Gly	Thr	Glu	Ala	Ser	Ile	Thr	Pro	Phe	Ala	Ile	Ala	Gly	Phe	Gln			
		210				215					220							
Ala	Leu	Thr	Ala	Leu	Ser	Thr	Thr	Glu	Asp	Pro	Thr	Arg	Ala	Ser	Ile			
225					230					235					240			
Pro	Phe	Asp	Lys	Asp	Arg	Asn	Gly	Phe	Val	Met	Gly	Glu	Gly	Ser	Gly			
			245					250					255					
Met	Leu	Val	Leu	Glu	Ser	Leu	Glu	His	Ala	Glu	Lys	Arg	Gly	Ala	Thr			
			260					265					270					
Ile	Leu	Ala	Glu	Val	Val	Gly	Tyr	Gly	Asn	Thr	Cys	Asp	Ala	Tyr	His			
		275					280					285						
Met	Thr	Ser	Pro	His	Pro	Glu	Gly	Gln	Gly	Ala	Ile	Lys	Ala	Ile	Lys			
		290				295					300							
Leu	Ala	Leu	Glu	Glu	Ala	Glu	Ile	Ser	Pro	Glu	Gln	Val	Ala	Tyr	Val			
305					310					315					320			
Asn	Ala	His	Gly	Thr	Ser	Thr	Pro	Ala	Asn	Glu	Lys	Gly	Glu	Ser	Gly			
			325					330					335					

Ala Ile Val Ala Val Leu Gly Lys Glu Val Pro Val Ser Ser Thr Lys
340 345 350
Ser Phe Thr Gly His Leu Leu Gly Ala Ala Gly Ala Val Glu Ala Ile
355 360 365
Val Thr Ile Glu Ala Met Arg His Asn Phe Val Pro Met Thr Ala Gly
370 375 380
Thr Ser Glu Val Ser Asp Tyr Ile Glu Ala Asn Val Val Tyr Gly Gln
385 390 395 400
Gly Leu Glu Lys Glu Ile Pro Tyr Ala Ile Ser Asn Thr Phe Gly Phe
405 410 415
Gly Gly His Asn Ala Val Leu Ala Phe Lys Arg Trp Glu Asn Arg
420 425 430

<210> 21

<211> 1273

<212> DNA

<213> Escherichia coli

<400> 21

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tgcggtagca ggacgctgcc agcgaactcg cagtttgcaa gtgacggtat ataaccgaaa 180
agtgactgag cgtacatgta tacgaagatt attggtactg gcagctatct gcccgaaaca 240
gtgcggacaa acgccgattt ggaaaaaatg gtggacacct ctgacgagtg gattgtcact 300
cgtaccggta tccgcgaacg ccacattgcc gcgccaaacg aaaccgtttc aaccatgggc 360
tttgaagcgg cgacacgcgc aattgagatg gcgggcattg agaaagacca gattggcctg 420
atcgttgtgg caacgacttc tgctacgcac gctttcccga gcgcagcttg tcagattcaa 480
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atTTTTggcg atggcgcggg cgctgcgggt ctggctgcct ctgaagagcc gggaatcatt 720
tccacccatc tgcatgccga cggtagttat ggtgaattgc tgacgctgcc aaacgccgac 780
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<210> 22

<211> 317

<212> PRT

<213> Escherichia coli

<400> 22

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			20					25					30		
Ile	Val	Thr	Arg	Thr	Gly	Ile	Arg	Glu	Arg	His	Ile	Ala	Ala	Pro	Asn
		35					40					45			
Glu	Thr	Val	Ser	Thr	Met	Gly	Phe	Glu	Ala	Ala	Thr	Arg	Ala	Ile	Glu
	50					55					60				
Met	Ala	Gly	Ile	Glu	Lys	Asp	Gln	Ile	Gly	Leu	Ile	Val	Val	Ala	Thr
65					70				75					80	
Thr	Ser	Ala	Thr	His	Ala	Phe	Pro	Ser	Ala	Ala	Cys	Gln	Ile	Gln	Ser
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Met	Leu	Gly	Ile	Lys	Gly	Cys	Pro	Ala	Phe	Asp	Val	Ala	Ala	Ala	Cys
			100					105					110		
Ala	Gly	Phe	Thr	Tyr	Ala	Leu	Ser	Val	Ala	Asp	Gln	Tyr	Val	Lys	Ser
		115					120					125			
Gly	Ala	Val	Lys	Tyr	Ala	Leu	Val	Val	Gly	Ser	Asp	Val	Leu	Ala	Arg
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Thr	Cys	Asp	Pro	Thr	Asp	Arg	Gly	Thr	Ile	Ile	Ile	Phe	Gly	Asp	Gly
145					150				155					160	
Ala	Gly	Ala	Ala	Val	Leu	Ala	Ala	Ser	Glu	Glu	Pro	Gly	Ile	Ile	Ser
				165					170				175		
Thr	His	Leu	His	Ala	Asp	Gly	Ser	Tyr	Gly	Glu	Leu	Leu	Thr	Leu	Pro
			180					185					190		
Asn	Ala	Asp	Arg	Val	Asn	Pro	Glu	Asn	Ser	Ile	His	Leu	Thr	Met	Ala
		195				200					205				
Gly	Asn	Glu	Val	Phe	Lys	Val	Ala	Val	Thr	Glu	Leu	Ala	His	Ile	Val
	210					215				220					
Asp	Glu	Thr	Leu	Ala	Ala	Asn	Asn	Leu	Asp	Arg	Ser	Gln	Leu	Asp	Trp
225					230				235				240		

Leu Val Pro His Gln Ala Asn Leu Arg Ile Ile Ser Ala Thr Ala Lys
 245 250 255
 Lys Leu Gly Met Ser Met Asp Asn Val Val Val Thr Leu Asp Arg His
 260 265 270
 Gly Asn Thr Ser Ala Ala Ser Val Pro Cys Ala Leu Asp Glu Ala Val
 275 280 285
 Arg Asp Gly Arg Ile Lys Pro Gly Gln Leu Val Leu Leu Glu Ala Phe
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<210> 23

<211> 789

<212> DNA

<213> Escherichia coli

<400> 23

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 aacgacaaac tgaaaggccg cgtagaagaa tttgccgctc aattgggttc tgacatcggt 180
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 gtttggccga aatttgacgg tttcgtacac tctattgggt ttgcacctgg cgatcagctg 300
 gatggtgact atgttaacgc cgttaccctg gaaggcttca aaattgcccc cgacatcagc 360
 tcctacagct tcgttgcaat ggcaaaagct tgccgctcca tgctgaatec gggttctgcc 420
 ctgctgaccc tttcctacct tggcgctgag cgcgctatcc cgaactacaa cgttatgggt 480
 ctggcaaaag cgtctctgga agcgaacgtg cgctatatgg cgaacgcgat ggggtccggaa 540
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 aaagacttcc gcaaaatgct ggctcattgc gaagccgtta ccccgattcg ccgtaccgtt 660
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 ctgaaataa 789

<210> 24

<211> 262

<212> PRT

<213> Escherichia coli

<400> 24

<400> 25

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gaattagtaa tggaattaga agacgagttt ggtactgaaa ttcctgatga agaagctgaa 180
aaaatcaaca ctggttggtga tgctgttaaa tttattaaca gtcttgaaaa ataa 234

<210> 26

<211> 77

<212> PRT

<213> *Staphylococcus aureus*

<400> 26

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Val	Asp	Ala	Asp	Lys	Val	Thr	Glu	Asp	Ala	Ser	Phe	Lys	Asp	Asp	Leu
			20					25					30		
Gly	Ala	Asp	Ser	Leu	Asp	Ile	Ala	Glu	Leu	Val	Met	Glu	Leu	Glu	Asp
		35					40					45			
Glu	Phe	Gly	Thr	Glu	Ile	Pro	Asp	Glu	Glu	Ala	Glu	Lys	Ile	Asn	Thr
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Val	Gly	Asp	Ala	Val	Lys	Phe	Ile	Asn	Ser	Leu	Glu	Lys			
65					70						75				

<210> 27

<211> 234

<212> DNA

<213> *Streptococcus pneumoniae*

<400> 27

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<210> 28

<211> 77

<212> PRT

<213> *Streptococcus pneumoniae*

<400> 28

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			20					25					30		
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		35					40					45			
Glu	Asp	Glu	Phe	Ser	Ile	Glu	Ile	Ser	Asp	Glu	Glu	Ile	Asp	Gln	Leu
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<210> 29

<211> 225

<212> DNA

<213> Streptococcus pneumoniae

<400> 29

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gtaatctcag	aaatcgaaga	tgcttttgat	atccaaatcg	aagcagaaaa	tgacttgaaa	180
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<210> 30

<211> 74

<212> PRT

<213> Streptococcus pneumoniae

<400> 30

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		20						25					30		
Ala	Asp	Ser	Leu	Asp	Leu	Phe	Gln	Val	Ile	Ser	Glu	Ile	Glu	Asp	Ala
		35					40					45			
Phe	Asp	Ile	Gln	Ile	Glu	Ala	Glu	Asn	Asp	Leu	Lys	Thr	Val	Gly	Asp
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65

70

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<211> 951

<212> DNA

<213> Haemophilus influenzae

<400> 31

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aatgcgatcg aagctgctca aattaatcct caagatattg aactgattat tgttgcaact 240
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gatgatgcga tttcttttga tttagccgca gcttgccacag gctttgtcta tgctttgagc 360
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tctggctata tcgagatgca aggtaacgaa acgttcaa at tggcagttcg tgaactttca 660
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gtgccacacc aagcaaattt acgtattatt acagcgacag ctaaaaaatt agaaatggat 780
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<210> 32

<211> 316

<212> PRT

<213> Haemophilus influenzae

<400> 32

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          20           25           30
Ile Val Thr Arg Ser Gly Ile Arg Glu Arg Arg Ile Ala Ala Glu Asp
        35           40           45
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Glu	Thr	Val	Ala	Thr	Met	Gly	Phe	Glu	Ala	Ala	Lys	Asn	Ala	Ile	Glu	50	55	60
Ala	Ala	Gln	Ile	Asn	Pro	Gln	Asp	Ile	Glu	Leu	Ile	Ile	Val	Ala	Thr	65	70	75
Thr	Ser	His	Ser	His	Ala	Tyr	Pro	Ser	Ala	Ala	Cys	Gln	Val	Gln	Gly	85	90	95
Leu	Leu	Asn	Ile	Asp	Asp	Ala	Ile	Ser	Phe	Asp	Leu	Ala	Ala	Ala	Cys	100	105	110
Thr	Gly	Phe	Val	Tyr	Ala	Leu	Ser	Val	Ala	Asp	Gln	Phe	Ile	Arg	Ala	115	120	125
Gly	Lys	Val	Lys	Lys	Ala	Leu	Val	Ile	Gly	Ser	Asp	Leu	Asn	Ser	Arg	130	135	140
Lys	Leu	Asp	Glu	Thr	Asp	Arg	Ser	Thr	Val	Val	Leu	Phe	Gly	Asp	Gly	145	150	155
Ala	Gly	Ala	Val	Ile	Leu	Glu	Ala	Ser	Glu	Gln	Glu	Gly	Ile	Ile	Ser	165	170	175
Thr	His	Leu	His	Ala	Ser	Ala	Asn	Lys	Asn	Asn	Ala	Leu	Val	Leu	Ala	180	185	190
Gln	Pro	Glu	Arg	Gly	Ile	Glu	Lys	Ser	Gly	Tyr	Ile	Glu	Met	Gln	Gly	195	200	205
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Glu	Thr	Leu	Ser	Ala	Asn	Asn	Leu	Asp	Lys	Lys	Asp	Leu	Asp	Trp	Leu	225	230	235
Val	Pro	His	Gln	Ala	Asn	Leu	Arg	Ile	Ile	Thr	Ala	Thr	Ala	Lys	Lys	245	250	255
Leu	Glu	Met	Asp	Met	Ser	Gln	Val	Val	Val	Thr	Leu	Asp	Lys	Tyr	Ala	260	265	270
Asn	Asn	Ser	Ala	Ala	Thr	Val	Pro	Val	Ala	Leu	Asp	Glu	Ala	Val	Arg	275	280	285
Asp	Gly	Arg	Ile	Gln	Arg	Gly	Gln	Leu	Leu	Leu	Leu	Glu	Ala	Phe	Gly	290	295	300
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<210> 33

<211> 233

<212> DNA

<213> Escherichia coli

<400> 33

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gttgagctgg taatggctct ggagaagagt ttgatactga gattccggac gaagaagctg 180
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<210> 34

<211> 78

<212> PRT

<213> Escherichia coli

<400> 34

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			20					25					30		
Leu	Gly	Ala	Asp	Ser	Leu	Asp	Thr	Val	Glu	Leu	Val	Met	Ala	Leu	Glu
		35					40					45			
Glu	Glu	Phe	Asp	Thr	Glu	Ile	Pro	Asp	Glu	Glu	Ala	Glu	Lys	Ile	Thr
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<210> 35

<211> 29

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<213> Streptococcus pneumoniae

<400> 35

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<210> 36

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<212> DNA

<213> Streptococcus pneumoniae

<400> 36

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<210> 37

<211> 324

<212> PRT

<213> Streptococcus pneumoniae

<400> 37

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			20					25					30		
Ser	Lys	Ala	Gly	Gly	Leu	Gly	Ile	Ile	Gly	Gly	Gly	Asn	Ala	Pro	Lys
		35					40					45			
Glu	Val	Val	Lys	Ala	Asn	Ile	Asp	Lys	Ile	Lys	Ser	Leu	Thr	Asp	Lys
	50					55					60				
Pro	Phe	Gly	Val	Asn	Ile	Met	Leu	Leu	Ser	Pro	Phe	Val	Glu	Asp	Ile
65					70					75					80
Val	Asp	Leu	Val	Ile	Glu	Glu	Gly	Val	Lys	Val	Val	Thr	Thr	Gly	Ala
				85					90					95	
Gly	Asn	Pro	Ser	Lys	Tyr	Met	Glu	Arg	Phe	His	Glu	Ala	Gly	Ile	Ile
			100					105						110	
Val	Ile	Pro	Val	Val	Pro	Ser	Val	Ala	Leu	Ala	Lys	Arg	Met	Glu	Lys
		115					120					125			
Ile	Gly	Ala	Asp	Ala	Val	Ile	Ala	Glu	Gly	Met	Glu	Ala	Gly	Gly	His
	130					135					140				
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145					150					155					160
Ile	Ser	Ile	Pro	Val	Ile	Ala	Ala	Gly	Gly	Ile	Ala	Asp	Gly	Glu	Gly
				165					170					175	
Ala	Ala	Ala	Gly	Phe	Met	Leu	Gly	Ala	Glu	Ala	Val	Gln	Val	Gly	Thr
			180					185					190		
Arg	Phe	Val	Val	Ala	Lys	Glu	Ser	Asn	Ala	His	Pro	Asn	Tyr	Lys	Glu
		195					200					205			
Lys	Ile	Leu	Lys	Ala	Arg	Asp	Ile	Asp	Thr	Thr	Ile	Ser	Ala	Gln	His
	210					215					220				
Phe	Gly	His	Ala	Val	Arg	Ala	Ile	Lys	Asn	Gln	Leu	Thr	Arg	Asp	Phe
225					230					235					240
Glu	Leu	Ala	Glu	Lys	Asp	Ala	Phe	Lys	Gln	Glu	Asp	Pro	Asp	Leu	Glu
				245					250					255	

Ile Phe Glu Gln Met Gly Ala Gly Ala Leu Ala Lys Ala Val Val His
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Gly Asp Val Asp Gly Gly Ser Val Met Ala Gly Gln Ile Ala Gly Leu
275 280 285
Val Ser Lys Glu Glu Thr Ala Glu Glu Ile Leu Lys Asp Leu Tyr Tyr
290 295 300
Gly Ala Ala Lys Lys Ile Gln Glu Glu Ala Ser Arg Trp Ala Gly Val
305 310 315 320
Val Arg Asn Asp

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